

Although this species is so closely connected with *C. aspersus* and *C. vermiculatus*, I think it deserves to be separated from them at present. Dr. Cabanis, when answering my questions respecting this species, says:—"Your *Crypturus* is not very different from *C. adpersus*, Licht. (which I consider identical with *C. vermiculatus*, Temm., Wagl.). The chief differences are that the vent is not whitish, but cinereous, and the flanks brownish like the back, not light ferruginous. I would consider your bird as the Peruvian form of the Brazilian *C. aspersus*."

I have named this bird after Mr. R. J. Balston.

I may here mention that *Crypturus bartletti*, Sel. et Salv. (Proc. Zool. Soc. 1873, p. 311), was obtained at Santa Cruz on the Hualaga river, E. Peru, not at Santa Cruz de la Sierra, as there stated in error.

5. A Contribution to the Molluscan Fauna of Madagascar.

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(Plates XXI. & XXII.)

Much still remains to be done before our knowledge of the terrestrial and fluviatile Mollusca of Madagascar will attain any thing like completeness. With the exception of *Achatina fulica*, *Helix magnifica*, and one or two others, I am not aware that the animals of any of the numerous species of shells already described from this island have been examined. Of non-operculate land-shells about eighty are now known, of operculate species about seventy-five, and about fifty forms have been recorded from the lakes and rivers; this computation includes the new species about to be described, and a few hereafter mentioned for the first time as inhabitants of Madagascar, which were originally described without localities. One minute species, *Helix barrakporensis*, has not previously been met with except in India, where it may have been introduced, as is the case with the large *Achatina fulica*, a most abundant shell in some parts of Madagascar and also at the Mauritius. A small South-African bivalve shell, *Limosina ferruginea*, is now cited for the first time as an inhabitant of the island; and *Sphærium madagascariense* of Tristram is scarcely separable from another African species, *S. capense* of Krauss. Four species belonging to genera not previously known from Madagascar are now described; these are *Vitrina madagascariensis*, *Cleopatra trabonjiensis*, *Corbicula madagascariensis*, and *Pisidium johnsoni*.

Part of the collection which is here reported upon was liberally presented to the British Museum by Mr. W. Johnson, who has recently returned to England, and to whom much praise is due for so carefully noting the precise localities where he collected the various species; and on this account his name will be found associated with

several of his own interesting discoveries. The remaining portion was obtained from the Rev. W. Deans Cowan, and was collected by him in a more southern part of the island than that visited by Mr. Johnson. It also contains several very interesting forms, notably the species of *Vitrina* previously referred to, and the *Bulimus nigri-lineatus* of Reeve, belonging to a section (*Rhachis*) of that immense group of land-snails which was hitherto unknown in Madagascar.

A. GASTROPODA.

CYCLOSTOMA MACAREÆ, var.

Hab. Betsileo (Cowan).

The typical form of this species, described by Petit, was originally collected in the south part of Madagascar, near Saint Augustin. The more northern variety from Betsileo is rather more coarsely sculptured, and has a distinct peripheral black zone, and sometimes a broader but less distinct one on the upper part of the last whorl.

CYCLOSTOMA BETSILEOENSE, sp. nov. (Plate XXI. fig. 2.)

Shell umbilicated, turbinate-globose, thinnish, finely spirally lirate, encircled with two more prominent white keels, one at the middle of the body-whorl, and the other above, decussated by close lines of growth; cinereous (except the reddish spire), copiously striped longitudinally with a brownish colour, with a few spiral purple-black lines and zones, one just beneath the central white carina, broader than the rest, and a rosy stripe outside the labrum. Whorls $5\frac{1}{2}$, separated by a narrowly channelled suture, which is beautifully clathrated by the lines of growth. Two nuclear whorls smooth, convex, forming an obtuse apex; the rest convex, but appearing a little angular at or a little above the middle, where the upper carina is situated. The visible spiral threads are six in number on the antepenultimate whorl, about twelve on the penultimate (including the two white keels), and nearly double the latter number upon the upper half of the body-whorl, the lower part having as many as thirty-two to thirty-five, those around the umbilicus being a trifle coarser than the rest, the interstices being everywhere decussated by the lines of growth. The spiral lineation is constant in three out of five examples, is chiefly confined to the last whorl, and is most conspicuous within the aperture when the shell is held up to the light. There are two lines above the upper white keel, two between it and the lower one, and about six beneath the latter, the uppermost being much broader than the rest. Aperture subcircular, chestnut within, very dark towards the outer lip, showing the external lines and bands, a little higher than wide. Peristome acute, white on the columellar margin, only narrowly reflexed, flatly and more widely expanded on the right or outer margin, pink, except at the upper part towards the suture.

Greatest diameter 25 millim., height 25.

Hab. Betsileo (Cowan).

In some respects *C. pulchellum* of Sowerby approaches this species.

The peristome is very similar; and the sculpture is somewhat of the same character. Still there are differences of form, of colour, in the sutures, and in the size of the aperture, which readily distinguish these forms, which no doubt inhabit different districts of the island.

Var. *a*.

Shell with a less elevated spire, shorter and broader whorls, more widely umbilicated, with a larger and more oblique mouth, and the outer lip not stained with rose.

Greatest diam. 30 millim., height 24.

Hab. Betsileo (*Cowan*).

Var. *b* (Plate XXI. fig. 3).

Shell a trifle more ventricose than var. *a*, with the umbilicus similar to that of the type, but the aperture larger and the peristome white, with the body-whorl smoother, with fewer and subobsolete spiral liræ, except within and around the umbilicus.

Greatest diam. 30 millim., height $26\frac{1}{2}$.

Hab. Betsileo (*Cowan*).

CYCLOSTOMA CONGENER, sp. nov. (Plate XXI. fig. 1.)

Shell openly umbilicated, subdepressedly turbinata, rather smooth, obsoletely spirally sulcate, striated with lines of growth which are puckered and distinct at the sutures; bright yellow, longitudinally streaked with a darker tint, dark cinereous behind the white expanded lip, encircled at the periphery by a vivid purple-brown band and with two or three hair-like lines of a paler colour, both above and below the middle. Spire elevated, conical, ending in a bluish obtuse tip. Whorls $5\frac{1}{2}$, very convex; the last large, strongly lirata around and within the umbilicus, where it is stained with purple-brown. Aperture large, oblique, ovate-subcircular, light brown within except near the lip, where it becomes of a very dark chestnut-brown or nearly black, this colour extending along the inside of the columellar edge. External band and lines visible within. Peristome roundly expanded and reflexed, white, broad on the dextral margin, narrower on the columellar side.

Greatest diam. 34 millim., height 30.

Hab. Tanala province (*Cowan*).

This form approaches most closely to *C. consanguineum* of Sowerby (= *C. obsoletum* of Reeve, not of Lamarck), but may be distinguished by its greater size, its yellow colour, dark apex, and rather more elevated spire. Both species have the same disposition of the spiral bands and lines—namely a single central broad zone, two narrower ones between it and the suture, which are visible on the spire, and two others beneath it and around the lower surface of the whorl. In some specimens of *C. consanguineum* some of the sulci around the umbilicus are also of a dark colour. On holding up a specimen of *C. congener* to the light, three lines above and three below the broad band are generally observable. *C. obsoletum* of Lamarck, according to Delessert's figure (Recueil, pl. 29. f. 11a)

has five or six lines on the penultimate whorl, and is a more elevated shell than *C. consanguineum* (= *obsoletum*, Rve.), in both these respects agreeing very well with *C. madagascariense* of Gray, which I consider almost identical with, or at most only a slight variety of, *C. unicarinatum* of Lamarck (non *C. unicarinatum* of Sowerby, Pfeiffer, and Reeve, = *C. fulvifrons*, Sowerby).

CYCLOSTOMA JOHNSONI, sp. nov. (Plate XXI. figs. 4, 5.)

Shell small but thickish; white, with a single purple-brown zone a little below the middle of the body-whorl; openly umbilicated, finely lirate upon the spire, smoother upon the last volution, especially on the lower surface, striated by lines of growth. Whorls 5, convex, separated by a deep suture, first two smooth, the third with about five fine spiral liræ, the penultimate with about eight rather finer ones, increasing in number but much more feebly developed upon the upper half of the last whorl, and quite obsolete beneath the periphery, and scarcely traceable within the umbilicus. Aperture a trifle oblique, subcircular, a little longer than wide, white, with the single band. Peristome continuous, expanded all round, rather more so on the columellar side than on the opposite margin.

Greatest diameter 14 millim., height $13\frac{1}{2}$; aperture 8 long, $6\frac{2}{3}$ wide.

Hab. South of Trabonjy, north-west central part of Madagascar (*Johnson*).

This very interesting species is not likely to be confounded with any previously described; and I have much pleasure in associating with it the name of its discoverer. It is a comparatively smooth shell, characterized by the simplicity of its coloration and the non-lirate lower surface of the body-whorl.

CYCLOSTOMA LINEATUM, Pfeiffer.

Cyclostoma lineatum, Pfeiffer, Conch. Cab. pl. 45. f. 3, 4; Smith, P. Z. S. 1881, p. 278 (as var. of *C. insulare*, Pfr.).

Hab. Valley of Marohogo near Mojonga, north-west Madagascar (*Johnson*).

The specimen from the above locality is exactly similar in all respects to the type of this species, which at one time I considered a variety of *C. insulare*. As the localities prove to be different, I now think it better to keep the two forms separate. Some small varieties of *C. insulare* from the country between Lake Nyassa and the east coast of Africa, referred to by me in the 'Proceedings,' approach very closely the present species. None of them, however, are absolutely identical, the umbilicus being a little more contracted, the spire a trifle lower, and the liration around and within the umbilicus decidedly coarser. In *C. lineatum* this is unusually fine. Pfeiffer described the shell as smooth; but this is not correct. To the unaided eye such appears to be the case; but on making use of a lens, the fine brown lines are seen to be elevated (*liræ*), and the lines of growth are by no means inconspicuous. The spiral lines number about twelve on the penultimate whorl, alternately fine and

still finer. *C. sarcodes*, Pfr., is still higher in the spire, with higher volutions, and more strongly lirate, especially on the lower surface of the last whorl.

VITRINA MADAGASCARIENSIS, sp. nov. (Plate XXI. figs. 6, 7.)

Shell ventricose, depressed, very thin, diaphanous; pale greenish yellow, with a brown line at the suture, and with the upper part of the outer lip of the same colour, brilliantly glossy. Spire small, a little elevated and obtuse at the apex. Whorls $3\frac{1}{2}$, convex, deep, and margined above at the suture; the first $1\frac{1}{2}$ microscopically decussated in a beautiful manner by minute spiral striæ and very fine lines of growth, the last two lacking the spiral striæ. Body-whorl large, with distinct, here and there subplicate, lines of growth, on the lower surface exhibiting indications of interrupted concentric striæ. Aperture subhorizontal, large. Columella arcuate, thin, wrinkled, as is also the base of the peristome.

Greatest diam. $15\frac{1}{2}$ millim., smaller 12, height 9.

Hab. Betsileo (*Cowan*).

This I believe is the only species of *Vitrina* at present known from Madagascar; and it bears some resemblance to certain forms of the genus from South Africa.

HELIX (*NANINA*?) *BALSTONI*, Angas.

H. balstoni, Angas, Proc. Zool. Soc. 1877, p. 528, pl. 54. f. 5.

Hab. Interior of Madagascar (*Angas*); forest 36 miles east of Antananarivo (*Johnson*).

The specimen presented to the British Museum by Mr. Johnson is narrowly perforated, in which respect alone it differs from the description of this species given by Angas. Two other shells in the Museum are also narrowly perforate; and even the above-quoted figure looks as if the example delineated were likewise umbilicate; so that it is possible the species was described as "imperforate" accidentally.

HELIX (*NANINA*?) *CLEAMESI*, sp. nov. (Plate XXI. figs. 8, 9.)

Shell very thin, semitransparent, vinous horn-colour, narrowly perforate, suborbiculate conical, keeled at the periphery, marked with curved lines of growth crossed and rendered minutely granular on the spire by fine concentric striæ, more finely concentrically striated on the under surface, more glossy and not granulated. Spire with slightly convex outlines, shortly conical, ending in an obtuse tip. Whorls 6, a little convex, regularly increasing, a little depressed near the lower submarginal suture, or, in other words, just above their periphery. Last volution keeled above the middle, the carina being less marked near the outer lip. Base convex. Aperture somewhat oblique, lunate. Outer lip obliquely arcuate above the feeble carination, straightish or even a little sinuated below it in a very slanting or receding direction. Columella narrowly expanded and reflexed over the perforation, forming below, with the basal edge, a regular wide curve.

Greatest width 26 millim., height 17.

Hab. Ankafana, Betsileo province (*Cowan*).

There is only one other Madagascar *Helix* which is likely to be confounded with this species, namely *H. balstoni* of Angas. The latter has the whole surface minutely sculptured with raised *criss-cross striæ* in addition to the lines of growth. It is also more acutely carinate, has a less convex spire, and the body-whorl is considerably smaller and less inflated below the periphery. In *H. cleamesi* the sculpture consists of *concentric striæ* crossing the lines of increase and rendering them beautifully granular on the upper surface.

HELIX (*KALIELLA*) BARRAKPORENSIS, Pfeiffer.

Helix (*Kaliella*) *barrakporensis*, Pfeiffer, Conch. Cab. pl. 147, f. 20-22; Reeve, Con. Ic. f. 816; Hanley, Conch. Indica, pl. 87, f. 7.

Hab. About 30 miles east of Antananarivo (*Johnson*).

On comparing the three specimens of this species from the above locality with a series from Simla in India, presented to the British Museum by Capt. T. Hutton, and also with the types described by Pfeiffer, I am unable to find any distinction, and consequently conclude that this species (like *Achatina fulica*) has been introduced into India.

HELIX (*HELICOPHANTA*) BICINGULATA, sp. nov. (Plate XXI, figs. 13, 14.)

Helix cornu-giganteum, Angas (non Chemnitz), Proc. Zool. Soc. 1877, p. 527.

H. questieriana, Angas (non Crosse), op. cit. 1878, p. 312.

Shell large, ovate, ventricose, imperforate or narrowly rimate; light olive-brown above, darker brown towards the lip, with the lower surface beneath the periphery still deeper in tint, encircled by two dark-brown slightly raised narrow bands, one at the periphery, the other and more distinct one above it. Spire depressed, convex, only a little raised above the body-whorl. Volutions 4, very rapidly increasing, convex, separated by a deepish suture; two upper ones striated by simple arcuate lines of growth; the third coarsely granular, the lines of growth being but feebly expressed; the last very large, much descending in front, granular at its commencement, the granules gradually disappearing and replaced by close, oblique, short indentations, also exhibiting five or six *nearly obsolete* concentric ridges above the upper brown zone, and two or three between it and the lower one, the lines of increase being more distinct upon this than the preceding whorl. Lower surface swollen around the umbilical region, marked with arcuate lines of growth, and oblique, close, short indentations like the upper surface, rounded at the periphery. Aperture obliquely elongate, bluish lilac within. Lip whitish, expanded, reflexed. Columella thickened, *arched forward* a trifle just beneath the umbilicus, *very granular*, expanded and reflexed over the perforation, sometimes not quite closing it,

united to the outer lip by a very thin granulated callosity, coating the whorl within the aperture.

Greatest diameter 76 millim., smallest 58, height (resting on its base) 35.

Hab. Ekongo, South-east Madagascar (*Waters*).

This is the species erroneously considered by Mr. Angas to be the *H. guestieriana* of Crosse, which much more closely resembles *H. ibaraoensis* of the former author. *H. guestieriana* is a more globose shell, with a higher penultimate whorl, a shorter aperture, a smooth columella, and a smooth callosity upon the body-whorl, which is encircled by several slightly raised ridges of more equal size than in *H. bicingulata*. The granular and slightly arched-forward columella in the latter species, the obliquely indented surface of the body-whorl, and the two very conspicuous brown slightly raised girdles around it, the lower one bordered by an indistinct pale one above, distinguish this from the allied forms, *H. cornu-giganteum*, *H. betsileoensis*, *H. ibaraoensis*, and *H. guestieriana*. The first two are openly umbilicated, the third generally imperforate (in about fifty specimens I have seen a few with a narrow perforation); and the last is said to be "narrowly subrimate." *H. betsileoensis* has the columella granular as in the present species; in the other three it is smooth. In *H. ibaraoensis* the callus uniting the columella and the outer lip and spreading over the whorl within the aperture is conspicuously granulated, and the epidermis is nearly black towards the lip.

All the five species here remarked upon are, no doubt, offshoots from one original progenitor; still I have found no difficulty in recognizing any specimen which has yet been examined. Probably no two exist in precisely the same locality. The following is the distribution as at present known:—

H. cornu-giganteum.

Hab. Island of Agalega, N.E. of Madagascar (*teste* Sir David Barclay!).

H. guestieriana.

Hab. Madagascar (no precise locality known).

H. betsileoensis.

Hab. S.E. Betsileo (*Angas*); Tanala country (*Deans Cowan*).

H. ibaraoensis.

Hab. S.E. Betsileo (*Angas*); Tanala country (*Deans Cowan*).

H. bicingulata.

Hab. Ekongo, south-east of the island (*Waters*).

HELIX (*MACROCYCLIS?*) *COVANI*, Smith. (Plate XXI. figs. 10-12.)

Helix (*Macrocyclus?*) *covani*, Smith, Journ. of Conch. vol. ii. p. 338.

Hab. Ankafana, Betsileo province (*Cowan*).

This species was originally described from a single specimen which

did not illustrate the full size attained by adult shells. The largest and apparently full-grown example recently brought to England by Mr. Cowan has a greatest diameter of 45 millim., is 34 across at the smallest diameter, and 20 high, resting upon its base. The peristome is not thickened or expanded on the upper margin, but is simple and arcuate.

HELIX (AMPELITA) SHAVI, Smith. (Plate XXII. figs. 1-3.)

Helix (Ampelita) shavi, Smith, Journ. of Conch. 1879, vol. ii. p. 339.

Hab. Tanala province (*Cowan*).

In this instance also, as with *H. covani*, the dimensions given in the above work are not those attained at times by this species. The largest before me is 35 millim. across the greatest width, and 28 at the smallest. All retain the character of the last whorl descending in front, and have the labrum more or less (sometimes entirely) violet-brown.

HELIX (AMPELITA) PERCYANA, Smith.

Helix (Ampelita) percyana, Smith, Proc. Zool. Soc. 1880, p. 485, pl. 48. f. 12, 12a.

Hab. Ankafana, Betsileo (*Cowan*).

Of this species, originally described from a unique specimen in Dr. Percy's collection, I have now seen four more, very similar to the type, and differing from one another only in the disposition and quantity of the remarkable opaque creamy-yellow zigzag markings. Sometimes the expanded outer lip is of a livid purple colour.

BULIMUS (RHACHIS) NIGRILINEATUS, Reeve. (Plate XXII. fig. 4.)

Hab. Betsileo (*Cowan*); —? (*Reeve*).

The type of this species, described by Reeve (Conch. Icon. pl. 77. fig. 567), is of immature growth. The name is not a characteristic one; for the lines are not black, but of a bronzy brown colour. Their disposition and number appear tolerably constant. There are two around the middle of the last whorl, of which the upper is a trifle the broader; a third is situated above these, intermediate between them and the suture; a fourth encircles the base; and at times two or three finer ones are met with in the same part; and in the immediate region of the columella the shell is horny and pellucid, contrasting conspicuously with the rest of the opaque yellow surface. The whorls are seven in number, rather convex, sculptured with lines of growth and microscopical spiral striæ. The apex is brownish horn-colour and not very acute. The columella is perpendicular and rather straight, narrowly reflexed above, thus forming a slight rimation.

STENOGYRA (CLAVATOR) JOHNSONI, sp. nov. (Plate XXII. fig. 5.)

Shell moderately thick, imperforate, elongate, subcylindrical, slightly shining; rich brown, with darker streaks here and there,

paler towards the apex, where the epidermis is mostly worn off, leaving a white surface; last whorl indistinctly transversely zoned and lined with dark brown. Volutions 7, rather convex, regularly increasing, longitudinally striated by the lines of growth, which are more or less puckered beneath the suture, and at times somewhat wrinkled through being crossed by a few obsolete transverse striæ. The extreme upper edge of the whorls is yellow at the suture. Body-whorl scarcely descending in front. Aperture inversely auriform, blue within, occupying three eighths of the entire length of the shell. Outer lip thickened within, dirty whitish. Inner lip of the same colour, thickened also, narrowly expanded in the umbilical region, joined to the labrum above by a thin callus.

Length 53 millim., width 21; aperture 20 long, $11\frac{1}{2}$ broad.

Hab. Near the river Anonivy, about fifty miles south of the capital, Antananarivo (*W. Johnson*).

This species might be regarded by some as a dwarf form of *S. eximia*, Shuttleworth; but, besides size, there are other distinctions. Mr. Johnson says he never could find the larger species at the above locality, nor did he ever meet with the smaller one in company with it elsewhere. As the last whorl in the present species scarcely descends at all, the suture is less oblique than in *S. eximia*; the surface is less puckered by transverse striæ, the breadth of the shell is greater in proportion to its length, the last whorl is less cylindrical, the columella is not so broadly reflexed or flattened in front, and the aperture is narrower at the base.

MELANATRIA JOHNSONI, sp. nov. (Plate XXII. figs. 6, 7.)

Shell large, elongate-pyramidal, turreted, thick, covered with an olive epidermis, closely lined or strigate with longitudinal lines of a darker tint. Whorls — ?, the remaining nine excavated at the upper part, very slightly convex beneath, strongly spirally ribbed and grooved. The ribs are six in number on the upper whorls and rounded; the two above are much more slender than the four beneath; the uppermost borders the suture; the next lies in the concavity at the top of the whorls; and the rest surround the slight convexity, and are three times as broad as the sulci separating them. All the whorls, with the exception of the last four, are coronated at the slight angle below the excavation with very short, hollow, oblique spinules; and some of the spiral grooves exhibit rows of fine granules. The last whorl descends somewhat, giving the shell a slightly distorted appearance; it is girded with about twelve transverse costæ, a few at the base being smaller than five principal ones around the middle. The aperture is bluish within, faintly stained with olive-brown near the margins. Peristome widely and deeply sinuated on the outer lip in the concavity of the whorl, arcuate and prominent in the middle, then shallowly sinuated again (*vide* fig. 7). Columellar margin thickened, free, arcuate, reflexed, ending in a distinct basal sinus.

Length 78 millim., diam. 24; aperture 24 across diagonally, and 16 in a transverse direction.

Hab. River Kamony, in the north-west of the island (*W. Johnson*).

This very striking shell is not uncommon in the above locality; and it is surprising that so large a species has not been brought to Europe before. It cannot be confounded with any of the other forms of *Melanatria*, being so remarkable on account of the very strong spiral ridges. Like many freshwater shells, this is also generally coated with a black earthy deposit.

CLEOPATRA TRABONJIENSIS, sp. nov. (Plate XXII. figs. 10, 11.)

Shell narrowly umbilicated, turbinate, thinnish, yellowish olive, with several transverse black lines and zones. Apex worn away. Remaining volutions $3\frac{1}{2}$, convex, bicarinate. Keels black; the upper one situated rather above the middle of the whorls, giving them a tabulated appearance, the lower one close to the suture; these keels are more or less obsolete on the body-whorl, especially near the lip. In addition the lower part of this volution is finely concentrically lirate, the ridges being rugose in consequence of being crossed by the lines of increment, which are rather conspicuous, and at times puckered at the carinæ. The entire surface is also microscopically striated in a spiral direction. Aperture roundly ovate, showing the external coloration. Lip thin. Columellar margin a little expanded and reflexed, whitish, joined above to the extremity of the outer lip by a very thin callosity. Operculum very concave exteriorly, brown; nucleus paucispiral, situated about halfway between the centre and the columellar edge.

Length 12 millim., diam. 7; aperture 6 long, $4\frac{1}{2}$ wide.

Hab. A small lake at Trabonjy, in the north-west central part of the island (*Johnson*).

The carination of the volutions, the minute spiral striation, the thinness of the shell, its umbilicus, and other features distinguish this species from *Paludomus madagascariensis* of Brot. In addition to the two dark keels, the upper part of the whorls has a broad zone at the suture, and the body-whorl has a similar band around the base in addition to one or two narrower ones above.

AMPULLARIA MADAGASCARIENSIS, sp. nov. (Plate XXII. figs. 8, 9.)

Shell subglobose, narrowly umbilicated, moderately thick, sculptured with lines of growth and more or less distinct microscopic spiral striæ; greenish olive, with numerous purple-brown transverse lines and zones. Whorls 6, flattened and broadly excavated above, convex at the sides, divided by a deep, pale sutural line; the last malleated in front, the aperture being towards the eye. First three whorls generally eroded and purple-black; when perfect, in young shells, very distinctly spirally striated. Aperture ovate-pyriform, purple-brown within, yellowish on the columella and towards the lip, where the spiral lines and zones are particularly vivid. Peristome simple, the columellar margin being well curved and a little reflexed, connected with the termination of the outer lip by a very thin

deposit of callus, before the deposition of which the starting-point of the columella is conspicuously defined by a transverse white line, which starts just above the umbilicus and winds round the penultimate whorl within the aperture. Operculum generally dirty lilac on the inside, but sometimes white or horny-brown.

Height 50 millim.; greatest diam. 49, smallest 38; aperture 36 long, 23 wide.

Hab. In a marsh, north of Antananarivo (*Johnson*); Imerina province (*Cowan*).

In form this species is not unlike *A. largillierti* of Philippi, but it is quite distinct in several respects. The spiral striation is finer, the umbilicus broader; the aperture is not angular or effuse at the base, nor has the last whorl the rounded keel or ridge at the base around the umbilical fissure.

A. cecillei, Phil., appears to be more ovate, with less tabulated whorls, has a higher spire, and is differently coloured.

It is only in adult specimens that the commencement of the aperture near the lip is yellow. The columella is also of that colour in full-grown shells, but bluish white in young ones. This species appears to arrive at maturity after two years' growth, as all the large specimens exhibit a dark longitudinal stripe or former lip just before the completion of the fifth whorl. In the young state this is very thin, and the colour is horny-brown, and not greenish olive like the last large whorl of the adult.

LIMNÆA HOVARUM, Tristram.

Limnæa hovarum, Tristram, Proc. Zool. Soc. 1863, p. 61.

Hab. Ankafana, Betsileo (*Cowan*).

This species grows to a larger size than that of the specimen described by Tristram; for one from the above locality is as much as ten lines long. In the larger shells the lines of growth become more prominent, forming arcuate and tortuous elevated ridges. The columella also is reflexed, appressed to the whorl, yet leaves a slight chink or rimation in the umbilical region. All the specimens examined exhibit traces of transverse or spiral striæ, generally interrupted and of a subpunctate character.

LIMNÆA ELECTA, sp. nov. (Plate XXII. figs. 12, 13.)

Shell small, ovate, transparent, corneous, narrowly rimate. Whorls 3-3½, convex, rapidly increasing. Spire small, obtuse and reddish at the apex. Last whorl elongate, sculptured with fine lines of growth crossed by a few spiral striæ. Aperture vertical, ovate, acuminate above, occupying about two thirds of the entire length of the shell. Columella rather high up, reflexed over the umbilical fissure, the reflexed portion being striated rather coarsely lengthwise.

Length 6½ millim., diam. 4; aperture 4½ long, 2⅔ wide.

Hab. About 20 miles from Antananarivo (*Johnson*).

This little species has much of the general aspect of the genus *Succinea*, and is peculiar on that account and the red tip of the spire.

PHYSA MADAGASCARIENSIS, Angas. (Plate XXII. figs. 18, 19.)

Physa madagascariensis, Angas, Proc. Zool. Soc. 1877, p. 528, pl. 54. figs. 2a, 2b.

Hab. Ekongo, S.E. Madagascar (*Waters*); Betsileo (*Cowan*).

The type figured in the 'Proceedings' is larger than any of the specimens from Betsileo, and rather broader and more globose than most of them; but all agree in the peculiar conspicuous longitudinal subliration or plication which adorns the surface. The suture is deep and channelled, and filled up by the upper terminations of the plicæ, which form fine erect lamellæ. *P. lirata* of Tristram has a depressed spire and even stronger liræ than the present species, in which the spire is at times considerably higher than in the shell depicted by Angas.

PHYSA LAMELLATA, sp. nov. (Plate XXII. figs. 14, 15.)

Shell very fragile, rimate, ovate, not very glossy, olivaceous horn-colour, longitudinally coarsely lamellato-lirate. Whorls 3-4, convex, separated by a deeply channelled suture, the last descending, not square-shouldered above. Aperture occupying a little more than three fourths of the entire length of the shell. Columella but little contorted, reflexed, joined to the lip above by a thin corneous callosity, more or less striated lengthwise.

Length 12 millim., diam. 9; aperture 9 long, 5 wide.

Hab. Twenty miles from Antananarivo (*Johnson*).

This may be but a variety of *P. lirata* of Tristram, of which there is a single specimen in the British Museum obtained from the collection of the late Henry Adams. It is chiefly distinguished by the difference in its form, the greater coarseness of the liræ, which have a thin lamellar epidermis attached to them. The last whorl descends near the aperture, and is not so squarely shouldered as *P. lirata*.

PHYSA OBTUSISPIRA, sp. nov. (Plate XXII. figs. 16, 17.)

Shell small, transparent, light horn-colour, narrowly rimate, somewhat glossy, indistinctly spirally striated, longitudinally plicately ridged, very regularly and strongly upon the spire and upper part of the body-whorl near the suture, the liræ on the lower part becoming subevanescent. Volutions $3\frac{1}{2}$ -4, very convex, rapidly increasing, separated by a deeply channelled suture. Spire very short, only a little raised above the last whorl. The latter descends in front, is large, and rounded at the shoulder above. Aperture inversely subauriform, and occupying about four fifths of the entire length of the shell. Columella very slightly twisted, narrowly reflexed over the umbilical fissure, connected with the lip above by a thin callus upon the whorl, which sometimes exhibits a few *white* lines upon it, disposed lengthwise.

Length 10 millim., greatest diam. 8; aperture 8 long, $4\frac{1}{2}$ wide.

Hab. About 20 miles from Antananarivo (*Johnson*); Betsileo (*Cowan*).

This, like all the known species of *Physa* from Madagascar, is

strongly lirated for this genus. It is a smaller form than *P. madagascariensis*, has a shorter and more obtuse spire, a narrower perforation and spiral striation. *P. lirata* is more strongly lirated than it, has the spire even still shorter, the body-whorl is prominently shouldered above, and the aperture is longer in proportion.

PLANORBIS MADAGASCARIENSIS, sp. nov. (Plate XXII. figs. 20-22.)

Shell moderately thick, deeply excavated both above and below, corneous brown, rather strongly striated by the lines of growth, and *sometimes* exhibiting traces of spiral striation. Whorls 4-4½, rapidly increasing; the last large, rather high, convex, rather deeply incurved at the suture both on the upper and underside, finely malleated, chiefly round the middle. Aperture largish, broadly lunate, raised above or on a level with the penultimate whorl. Peristome thin, receding at the base, its extremities connected by a very thin deposit of callus on the whorl.

Greatest diam. 12½ millim., smallest 10, height 4¾.

Hab. Lake Itasy (*Johnson*).

This species is very like *P. pfeifferi*, Krauss (Sudafr. Moll. pl. v. f. 7), but may be distinguished by the malleation of the last whorl, its greater height, and browner colour.

NERITINA GAGATES, Lamarck.

Neritina gagates, Lamarck (*vide* Martens, Conch. Cab. p. 94).

Hab. Tamatave (*Cowan*).

Two specimens from the above locality I believe to belong to this species, differing only in the deep red colour of the columellar callosity, and the olive-green tint of the outer lip. The form is the same; and the denticles on the columella, the painting, the microscopic spiral sculpture, and the operculum are all similar.

NERITINA FULGETRUM, Reeve. (Plate XXII. figs. 23, 24.)

Neritina fulgetrum, Reeve, Conch. Icon. pl. 23. f. 103 a, sp. 103.

Hab. — ? (*Reeve*); south of Tamatave (*Johnson*).

This species has hitherto been represented by a single specimen without any locality in the Cumingian collection, now in the British Museum. As the description in the 'Conchologia Iconica' is very short and incomplete, I will here add a few further details. The black zigzag lineation at times is very close, thus giving the shell a greyish appearance when viewed at a distance; and a character not referred to by Reeve, but indicated in his figure, is the brown margin to the body-whorl at the suture, beneath which the volution is faintly constricted. The columellar callosity is much thickened and of a red colour, and extends some distance over the whorl. The edge of the columella is pale, straight, with a shallow sinus a little below the middle, furnished with about a dozen denticles. The aperture is rather small, bright yellow far within, then whitish, and again yellow or greenish-yellow at the lip. The operculum is slaty black ex-

teriorly, with the arcuate margin red, and reddish on the inner surface, with two pale rays from the nucleus, one central and the other sub-marginal, the extreme edge being blackish. In all these respects it coincides with that of *N. gagates*, Lamarck, from the Mauritius; and the terminal processes are similar in both forms. Von Martens's conjecture that the species might belong to *N. retifera*, Benson (Conch. Cab. p. 283), is not to be wondered at, considering the briefness of Reeve's description, and the fact of only the back of the shell being figured.

B. CONCHIFERA.

CORBICULA MADAGASCARIENSIS, sp. nov. (Plate XXII. figs. 25-27.)

Shell a little inequilateral, rounded and narrow in front, much broader, squarish, and subtruncate posteriorly, arcuate along the ventral margin, finely concentrically striated; yellowish, greenish down the posterior side. Umbones a little prominent, incurved, situated a little anteriorly. Interior lilac, with two or three rather distant concentric purple zones, stained with dark purple down the posterior side, and with a smaller stain of the same colour at the anterior side.

Length $11\frac{1}{2}$ millim., width 14, diameter 7.

Hab. Twenty miles from Antananarivo (*Johnson*).

The concentric striæ are deep and regular upon the umbones; but towards the ventral margin they become less regular and finer, and in front are rather more strongly developed than towards the posterior side. This is the first record of the genus in Madagascar; and I have not been able to associate the species with any of the forms described from the adjacent continent.

SPHÆRIUM MADAGASCARIENSE, Tristram.

Sphærium madagascariense, Tristram, Proc. Zool. Soc. 1863, p. 61; Sowerby, Conch. Icon. pl. iii. f. 22, bad!

Hab. Two days west of Antananarivo (*Tristram*); about 20 miles from the capital (*Johnson*); Betsileo (*Cowan*).

This species is scarcely if at all different from *S. capense* of Krauss, and is mainly distinguished by difference in locality. The slight compression of the valves towards the circumference, remarked upon by Tristram, is not constant in all specimens, some exhibiting it in a comparatively decided manner, whilst others are rounded at that part just like the South-African form.

LIMOSINA FERRUGINEA, Krauss.

Cyclas ferruginea, Krauss, Sudafr. Moll. p. 7, pl. i. f. 7; Clessin (as *Limosina*), Conch. Cab. p. 247, pl. 46. f. 1-4; Sowerby (as *Sphærium*), Conch. Icon. f. 47, not good!

Hab. The river Knysna, South Africa (*Krauss*). About 20 miles from Antananarivo (*Johnson*). Also Mauritius (*Brit. Mus.*).

The specimens from Madagascar agree exactly with a typical example of this species purchased by the British Museum of Dr. Krauss. The figure in the 'Conchylien-Cabinet' appears to be far more characteristic than that in Krauss's work.

PISIDIUM JOHNSONI, sp. nov. (Plate XXII. figs. 28, 29.) BM 1949

Shell minute, ventricose, inequilateral, glossy, finely concentrically striated, pale grey. Umbones large, inflated, without a small pointed nucleus. Posterior side longer and narrower than the anterior, obliquely sloping from the beaks, rounded at the extremity; anterior end broader, blunter.

Length 2 millim., width $2\frac{1}{3}$, diam. $1\frac{1}{2}$.

Hab. About 20 miles from Antananarivo (*Johnson*).

This species is considerably like *P. ventricosum* of Prime, but is not quite so swollen or so inequilateral. The beaks take the form of an apical glossy cap without any small pointed apex. The ligament is small and linear.

EXPLANATION OF THE PLATES.

PLATE XXI.

- Fig. 1. *Cyclostoma congener*, p. 377.
 2. — *hetsileoense*, p. 376.
 3. — —, var., p. 377.
 4, 5. — *johnsoni*, p. 378.
 6, 7. *Vitrina madagascariensis*, p. 379.
 8, 9. *Helix (Nanina) cleamesi*, p. 379.
 10, 11, 12. — (*Macrocyclus?*) *covani*, p. 381.
 13, 14. — (*Helicophanta*) *bicingulata*, p. 380.

PLATE XXII.

- Figs. 1, 2, 3. *Helix (Ampelita) shavi*, p. 382.
 4. *Bulinus (Rhachis) nigrilineatus*, p. 382.
 5. *Stenogyra (Clavator) johnsoni*, p. 382.
 6. *Melanatria johnsoni*, p. 383.
 7. Ditto, lateral view of labrum.
 8, 9. *Ampullaria madagascariensis*, p. 384.
 10, 11. *Cleopatra traboujensis*, p. 384.
 12, 13. *Limnaea electa*, p. 385.
 14, 15. *Physa lamellata*, p. 386.
 16, 17. — *obtusispira*, p. 386.
 18, 19. — *madagascariensis*, p. 386.
 20, 21, 22. *Planorbis madagascariensis*, p. 387.
 23, 24. *Neritina fulgetrum*, p. 387.
 25, 26, 27. *Corbicula madagascariensis*, p. 388.
 28, 29. *Pisidium johnsoni*, p. 389.